

Thesis Portfolio

Investigating the Efficacy of Virtual Experiences on Stress Reduction
(Technical Report)

The Ethics of the Extension of Euthanasia to Depression Patients
(STS Research Paper)

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Bachelor of Science in Systems & Information Engineering

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SOCIOTECHNICAL SYNTHESIS

INVESTIGATING THE EFFICACY OF VIRTUAL EXPERIENCES ON STRESS REDUCTION

with Bailey Biber, Max Dodge, Melanie Gonzalez, Raymond Huang, Liv Johnson, Zach Martin,
Vy Lan Tran, & Sophia Xiao

Technical Advisor: Laura Barnes, Department of Engineering Systems and Environment

THE ETHICS OF THE EXTENSION OF EUTHANASIA TO DEPRESSION PATIENTS

STS Advisor: Kent Wayland, Department of Engineering and Society

PROSPECTUS

Technical Advisor: Laura Barnes, Department of Engineering Systems and Environment

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Over 450 million people worldwide are affected by mental illness. The way mental illness is addressed and treated changes among different environments and demographics. My capstone project explores how stress and anxiety can be managed and reduced in the workplace through immersive micro-vacations in virtual reality booths. The technology is specifically being produced for adults in the workplace, so for my STS topic, I researched a more specific mental illness and how it is being addressed. I investigated how different cultures and societies have shaped laws regarding euthanasia. In some countries, including the Netherlands, euthanasia rights have been extended to depression patients which poses a new ethical challenge to policy makers who have to decide whether to allow this. Overall, I explored the question: is it ethical to allow people that are diagnosed with depression to make the decision of using controlled suicide, a humane way to end their own lives? This gave insight into understanding the need for and importance of healthcare and resources for mental illness for all people. The question that engulfs both the STS topic and technical topic are: how are mental illnesses addressed and treated among different cultures and demographics?

The technical project explored the combination of Attention Restoration Theory and virtual reality (VR) technology as a novel therapy for short- and long-term stress reduction in the workplace, and to also decrease healthcare costs. Study participants were guided through a nature or urban environment using the virtual reality program and booth provided by Even Health, or provided with a 2D experience of the same images through a laptop. The participants completed a 10-minute Cognitive Demand Battery that consisted of a Serial 3's subtraction task, a Serial 7's subtraction task, and a Rapid Visual Information Processing task in order to induce minor stress or fatigue prior to the VR and 2D experiences. Biometric data such as heart rate, blood pressure, and galvanic skin response were collected from the participants at various points

throughout study in order to measure the changes in stress levels before, during, and after both the “micro-vacation” experiences. The results were analyzed in Qualtrics and R by comparing the VR experience versus 2D experience and the two sub-conditions, participants viewing nature scenes and participants viewing urban scenes, to determine if the nature scenes in VR significantly reduce stress. Statistical tests were used to determine if there was a statistically significant difference between the two conditions and corresponding sub-conditions. As we were unable to complete our study, we hypothesized that both the conditions in the VR booth will reduce stress levels in participants to a greater degree than the 2D images, but the extent will be greatest within the nature condition.

For my STS topic, I researched the extension of euthanasia to patients diagnosed with severe depression in the Netherlands and compared it to a country where it is illegal, the United States. Overall, the paper explored the question: is it ethical to allow people that are diagnosed with depression to make the decision of using controlled suicide? The different sides of ethical versus unethical were explored using not only Utilitarianism and Kantianism, but through exploring the debates on topics such as the responsibility to preserve life, respect for the autonomy of the patient, and cultural differences between societies with opposing views. I then researched possible unintended consequences of allowing depression patients to utilize euthanasia laws. In my research, I discovered two theories that may be the concept behind suicide. The first that I researched is called coupling, which is the idea that if methods of suicide are taken away, suicide statistics will decrease because behaviors are linked to very specific circumstances. The second theory was displacement, the idea that if someone is going to commit suicide, they will do so regardless of if their first choice of method is taken away. My research showed that euthanasia can be thought of as an additional method for suicide and if coupling is

possibly the theory behind suicide instead of displacement, this could mean that the allowing euthanasia for people with depression could increase suicide rates, not only for the Dutch, but for the countries that may adopt the same laws regarding euthanasia. Even though correlation does not imply causation, suicide rates increased, per one million population, in the Netherlands once euthanasia was legalized and extended to depression patients in 2002. Ultimately, from my research I concluded that legalizing euthanasia and allowing fragile patients to utilize it, dangerous consequences can come about. As I am not in the shoes of these patients, I feel it is only fair for me to shed light on the decisions that they have and we have on this topic, but not to take a side.

Under the current circumstances, I feel as if a lot of my work was left unfinished due to the disappointing and abrupt end to our fourth year studies. For my capstone project, my team was never able to complete our experiment and therefore our research and conclusion. Throughout the year, my two projects were captivating to research and taught me a lot. For my technical project, researchers should next complete the study by using the experiment that we have set up and were supposed to run on human subjects. This will give data and a conclusion to the answers that we were looking for. For my STS research, I believe that this can be carried a step further by closely monitoring how the legalization of euthanasia for depression patients changes not only thought processes in doctors and patients, but the statistics that follow. They need to monitor the policies and the suicide rates in order to later decide if the legalization is in the best interest of the patients, physicians, and community as a whole.